

REMARKS

Claims 15-19 were pending. Claims 20-30 have been added. Claims 15, 16, and 19 have been amended. Claims 15-30 are pending.

The Examiner objects to claim 18 on the basis of improper dependence. Independent claim 15, from which claim 18 depends, has been amended to address the Examiner's concerns. Claim 18 is submitted as particularly pointing out and distinctly claiming the subject matter of the invention.

Claims 15, 18, and 19 stand rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Pat. Appl. Pub. No. 2002/0141120. This rejection is traversed.

Claim 15 recites a method of forming a magnetic tunnel junction element that includes "forming a free ferromagnetic layer" and "forming a pinned ferromagnetic layer." The method also includes "forming a tunnel junction barrier layer between the free and pinned layers" and "forming an offset ferromagnetic layer in flux communication with the pinned layer which reduces demagnetization coupling between the pinned ferromagnetic layer and the free ferromagnetic layer." The free ferromagnetic layer is "arranged to align magnetically in either of two orientations with respect to the pinned ferromagnetic layer for storage of bit data."

The reference to Gill discloses a method of making a sensor structure, not a memory element. Significantly, the free layer and the pinned layers in the sensor disclosed by the Gill reference have magnetic fields oriented perpendicular to each other for sensing, not for data storage. In addition, the structure disclosed by the Gill reference utilizes an AP-pinned layer, and an antiferromagnetic coupling layer disposed between the AP-pinned layer and a bias layer. Further, the magnetic field of the bias layer is transverse to that of the free layer. The reference to Gill does not teach

or suggest a method of forming a magnetic tunnel junction element in which “the free ferromagnetic layer is arranged to align magnetically in either of two orientations with respect to the pinned ferromagnetic layer for storage of bit data.” The Gill reference does not anticipate the invention recited in claim 15. Claim 15 and its dependent claims 16-18 and 20-24 are submitted as patentable over the reference to Gill.

Claim 19 recites a method of forming a magnetic memory element that includes “forming a free ferromagnetic layer” and “forming a pinned ferromagnetic layer.” The method also includes “forming a tunnel junction barrier layer between the free and pinned layers,” “forming an antiferromagnetic layer for pinning the pinned layer,” and “forming another ferromagnetic layer on a side of said antiferromagnetic layer which is opposite a side on which said pinned layer is formed, said another ferromagnetic layer receiving flux coupling between said free and pinned layers.” The free ferromagnetic layer is “arranged to align magnetically in either of two orientations with respect to the pinned ferromagnetic layer for storage of bit data.”

The reference to Gill discloses a method of making a sensor structure, not a memory element. The free layer and the pinned layers in the sensor disclosed by the Gill reference have magnetic fields oriented perpendicular to each other for sensing, not for data storage. In addition, the structure disclosed by the Gill reference utilizes an AP-pinned layer, and an antiferromagnetic coupling layer disposed between the AP-pinned layer and a bias layer. Further, the magnetic field of the bias layer is transverse to that of the free layer. The reference to Gill does not teach or suggest a method of “forming a tunnel junction barrier layer between the free and pinned layers,” “forming an antiferromagnetic layer for pinning the pinned layer,” and “forming another ferromagnetic layer on a side of said antiferromagnetic layer which is opposite a side on which said pinned layer is formed, said another ferromagnetic layer receiving flux coupling between said free and pinned layers,” wherein the free ferromagnetic layer is

“arranged to align magnetically in either of two orientations with respect to the pinned ferromagnetic layer for storage of bit data.” The Gill reference does not anticipate the invention recited in claim 19. Claim 19 and its dependent claims 25-30 are submitted as patentable over the reference to Gill.

Claims 16 and 17 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Gill in view of further remarks. This rejection is traversed.

Claims 16 and 17 depend from claim 15, which is submitted as patentable over the Gill reference. The Examiner’s further remarks do not cure the deficiencies of the Gill reference. The Examiner’s further remarks relate to magnetic materials for the free layer, the pinned layer, and the pinning layer. The Examiner’s further remarks do not address how to modify Gill to provide a method as recited in claim 15 that includes forming a magnetic tunnel junction element in which “the free ferromagnetic layer is arranged to align magnetically in either of two orientations with respect to the pinned ferromagnetic layer for storage of bit data.” Claims 16 and 17 are submitted as patentable over the proposed combination of the reference to Gill and the Examiner’s further remarks.

In view of the above, each of the presently pending claims in this application is believed to be in immediate condition for allowance. Accordingly, the Examiner is

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respectfully requested to pass this application to issue.

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Respectfully submitted,

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